Washington State Department of Ecology
Industrial Footprint Project

Proposed Aggregation System for Industrial Footprint Indicators

Prepared in Support of Project Tasks 2.4 and 2.5

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Project Tasks 2.4 and 2.5

1.0: Background

In early October 2007 and as part of its Project Task 2.2 report, Redefining Progress (RP) and Center for Sustainable Economy (CSE) submitted recommendations for a draft set of indicators to the Washington State Department of Ecology (DOE) to support a single Industrial Footprint Project (IFP) metric applicable to the pulp and paper sector. Our recommendations included 22 indicators in the environmental, economic, and social domain and a mix of simple, aggregate, and index indicators. Regardless of the final disposition of the indicator set, an aggregation system will be needed to combine the final indicators into a single metric, which can either be expressed as a positive score (i.e. something to maximize) or a negative score (something to minimize). The Project Task 2.4 workplan includes a proposed aggregation system. This report discusses one possible approach. The remainder of this memo provides the details. A subsequent Project Task 2.4 and 2.5 report will be prepared once the IFP indicator set is finalized. That report will specify the aggregation method actually used and provide the final spreadsheet.

In Section 2.0, we discuss four key features of the aggregation system:

- Indicators of three major types
- Converting indicators into scores on a scale of 0 to 100
- Internal and external weights
- Aggregating weighted scores to arrive at domain and overall footprint scores.

In Section 3.0, we apply the aggregation system to a hypothetical set of 9 indicators, 3 from each domain, and one of each type. In Appendix A and B, we demonstrate how the aggregation system works in detail by focusing on three hypothetical indicators from the economic domain.

2.0: Key Features of the Aggregation System

2.1 Distinguishing between types of indicators.

There are three major types of indicators that will be represented in the final Industrial Footprint indicator set: single indicators, aggregate indicators, and indices.

Single indicators are stand alone indicators that are relatively straightforward to compile from a limited set of underlying data. An example is kilograms of biological oxygen demand (BOD) per air dried ton of production or lost time injury frequency rate. We can refer to these as “simple” indicators because while they may require one or more elements of underlying data, the underlying data themselves may not be considered useful indicators. For example, the BOD indicator requires two underlying pieces of data, air dried tons of production and total BOD, neither of which is used by itself as an indicator when comparing mills of different sizes.

Likewise, the accident rate indicator is composed of number of accidents with lost time and number of hours worked by the workforce, neither of which are particularly useful as stand-alone indicators when comparing mills with vastly scales of operation.

Aggregate indicators, on the other hand, are indicators whose underlying data may consist of useful simple indicators. For example, an aggregate indicator proposed is social investment, which tracks the monetary value of all cash and in-kind donations of goods, services, and volunteer hours as a percentage of facility profits. It may be important to track the monetary value of non-cash investments separately or various categories of cash investments (i.e. grants, scholarships, public infrastructure expenditures) separately and if so, the aggregate social investment indicator will be made up of several simple indicators of interest by themselves. Aggregate indicators may also include additional sets of data that are not useful as indicators but needed for combination purposes. Another distinguishing feature of aggregate indicators is that they rely on straightforward mathematical combination of simple indicators – i.e. adding them together or taking their product.

Index indicators, on the other hand, may consist of one or more simple indicators and other data as well, and require more complexity and more assumptions in converting constituent data into an indicator score. This is because they may consist of very different kinds of data. For example, a biological diversity index would need to combine simple “yes” or “no” indicators – such as the existence of any “may effect” determinations by trained wildlife or fisheries ecologists with quantitative data on percent of each habitat type on lands owned or managed by a mill that falls into various categories of land protection, where each level of protection has a different level of effectiveness associated with it. Thus, the main difference between aggregate indicators – which, as the name implies, require simple aggregation – and indices is the complexity associated with the combination of underlying data sets.

2.2 Converting all indicators to a score between 0 and 100.

One simple way to facilitate aggregation of indicators of various types is to assign raw indicator values a score on a scale of 0 to 100. For some indicators, this is already embedded in the indicator itself. For any indicator expressed as a percent, such as percent of employees covered by collective bargaining agreements or the percent of water used that is recycled there is a one to one correlation between the raw indicator value (34%) and the score (34). However, in most cases, it may not be possible for mills to achieve 100% (or 0% for something we want to reduce) so there should be a different way to map raw indicator values into the 0 to 100 range. This is also true for indicators that are not expressed in percentages.

One way to do this is to establish “industry best” or target values for the indicators, calculate a mill’s raw indicator value as a percentage of that level, and then multiply by 100. So, for example, if the industry best water utilization rate is 80% and an individual mill’s raw indicator value is 50%, its score is simply (50/80)*100 or 62.5.

For indicators that we want minimize, the task is a bit more complicated. This is because it is not possible to express a higher number as a percentage of a lower number on a scale bounded by 100%. For example, for a given indicator, let's say that the industry best level is 2, and a mill's raw indicator has a value of 20. In this case, the mill's value is 1000% higher than the industry best. So for these kinds of indicators, the method may involve establishing a range where the industry best is assigned a score of 0 and the industries worst a score of 100. Let's say the range is between 34 and 55. Each raw indicator increment of 1 over and above the baseline of 34 adds 4.76 points to the score or 100/(55-34). So a score of 35 would translate into a score of 4.76 on a scale of 100, a score of 45 would translate into a score of (45-34)*4.76 or 52.36 and so on.

Another method that is less continuous and applicable to both positive and negative metrics is to base the scoring system on ranges, for example industry worst, industry average, compliance, beyond compliance, and industry best. The range would cover 20 points each, so that industry worst would occupy the 0-20 scoring bracket, industry average 20-40, etc. This type of scoring system puts less weight on exact scores and more on maintaining scores within target brackets over time. This approach may be more suitable for indicators that vary considerably year to year for reasons unrelated to mill decisions (i.e. climate factors).

2.3 The footprint as either a positive or negative interpretation.

It has yet to be resolved whether the Industrial Footprint metric will be more like a sustainability score where higher scores indicate higher levels of achievement or more like the typical footprint metric where the goal is to reduce it to as close to zero as possible. Either way, a scoring system based on scores of 0 to 100 can be readily adapted. This is because the "inverse" of a positive score of, say, 80, is simply 100-80 or 20. As a positive score climbs, the inverse drops by the same amount. In this way, as a positive indicator's score climbs to 100, its inverse, or negative interpretation, falls to zero. In this way, an indicator set can include both positive and negative indicators. If the choice is to make the Industrial Footprint metric a positive score, then all negative indicators can be converted into their positive "inverse," and vice versa.

2.4 Weighting and aggregation.

For various reasons, it may be important to assign greater weight to some indicators relative to others. If the goal is to arrive at a single overall footprint score for a mill based on a scale of 0 to 100, then the easiest weighting scheme would be based on weighted averages. Weighted averages allow combination of two or more indicator scores, each scored on a scale of 0 to 100, into a single score on that same scale. The way to do this is to assign each indicator a weight that, in essence, represents the percent of the combined score we want to attribute to that particular indicator. Weights must add up to 100%. Weights are multiplied by each raw indicator score, and then summed to arrive at the weighted average.

So, for example, say we have an index indicator made up of three simple indicator scores: A with a score of 50, B with a score of 75, and C with a score of 40. Because indicator B may reflect a high priority community concern and C a low concern, we may want to count indicator B the most, followed by A and C. To operationalize this, we assign a weight of .50 or 50% to B, .30 or 30% to A, and .20 or 20% to C. The weighted average is .30*50 + .50*75 + .20*40, or 60.5. If we want to assign equal weight to each indicator, then we multiply each raw indicator score by .333 which is just another way to take the simple average (50+75+40)/3 = 55. The weighting scheme is necessarily subjective, and, as such, could be an important topic for stakeholder dialogue.

For aggregate and index indicators, the weighted average approach is applicable both internally and externally (i.e. after the aggregate or index has been created) since they are made up of more than one simple indicator. In assigning external weights, it is important to consider the number of simple indicators they embody. If for example, an aggregate indicator consists of 3 or 4 simple indicators, we may want to have it "count" 3 or 4 times more than a simple stand alone indicator if an equal weighting scheme is adopted, more or less if we want to emphasize or de-emphasize the aggregate indicator.

2.5 Aggregating weighted scores to arrive at domain and overall footprint scores.

Assuming that the Industrial Footprint metric will be based on a scoring system of 0 to 100, and expressed either as a positive metric (i.e. 100 is the highest score) or negative metric (0 is the highest score) the aggregation system can be summarized in five simple steps:

1. Convert each raw indicator value into a score on a scale of 0 to 100.
2. Take the inverse of negative indicators if a positive Industrial Footprint metric is selected, the inverse of positive indicators if a negative Industrial Footprint metric is selected.
3. For aggregate indicators and indices, assign weights internally, then multiply weights by indicator scores to arrive at a single score for the aggregate or index.
4. Assign weights to all indicators within a domain, weighting aggregates and indices in proportion to the number of simple indicators they embody, multiply weights by indicator scores, and then sum to arrive at a single score for the domain.
5. Assign weights to each domain, multiply domain weights by domain scores and then sum to arrive at the final Industrial Footprint score.

3.0 An Example Using the Mock Aggregation System Spreadsheet

This approach can be demonstrated with reference to the mock aggregation spreadsheet that accompanies this report. Snapshots of the spreadsheet are attached as Appendix A and B. The spreadsheet includes an Overall Footprint tab and an Economic Footprint tab. The Economic Footprint tab (Appendix A) illustrates how three indicators – one of each type – are converted into scores of between 0 and 100 and expressed as either positive or negative metrics. It also demonstrates how calculations become more complex as we move from simple to aggregate to index indicators. The Overall Footprint tab (Appendix B) illustrates how 9 indicators from each domain can be weighted then aggregated into a single Industrial Footprint score, again, expressed either as a positive or negative metric.

On the Economic Footprint tab, we include three indicators:

- simple indicator, return on capital employed (ROCE)
- An aggregate indicator, economic impact
- An index of customer satisfaction.

While actual data included in the spreadsheet are hypothetical, the indicators themselves, the kinds of data supporting them, and the calculation methods are either taken from published sources or based on standard methodologies.

3.1 Return on capital employed.

Return on capital employed (ROCE) is a financial indicator used to evaluate the efficiency and profitability of a company's capital investments, and is currently reported in several pulp and paper sector sustainability plans. While there are several reasons why ROCE is an important measure related to economic sustainability, one basic reason is that if ROCE is lower than the rate at which the company borrows, it generally indicates that a business is not generating enough returns to pay for its cost of capital. ROCE is calculated as:

$$\frac{\text{Earnings Before Taxes and Interest (EBIT)}}{\text{(Total Assets – Current Liabilities)}}$$

Because EBIT, Total Assets, and Current Liabilities are not particularly (at least we assume that here) interesting by themselves, the ROCE indicator can be considered a "simple" indicator, as defined earlier. Cells B12 – E19 on the mock aggregation spreadsheet show how hypothetical ROCE values for four separate mills can be converted into sustainability scores on a scale of 0 to 100. First, ROCE is calculated using the formula above. Next, since ROCE is a positive indicator and a percentage, we simply divide each mill's ROCE value by the industry best value. Here it is assumed to be 22%. Multiplying these fractions by 100 gives us the relevant ROCE footprint score for each mill: 68.59 for mill A, 30.72 for mill B, 83.01 for mill C, and 92.32 for mill D. If the Industrial Footprint metric is expressed as positive, then these are the final indicator scores since their value is maximized at 100 if a mill achieves the industry best ROCE value of 22%. If it is expressed as a negative metric, then we simply take the "inverse" by subtracting each score from 100 so that as each mill's raw indicator value approaches 22% the footprint score will fall to zero.

3.2. Economic impact.

As part of the Project Task 2.2 report, RP and CSE recommended use of a "regional economic impact" aggregate indicator to quantify the economic benefits to the State of Washington generated by the pulp and paper sector. Cells B24 – G43 and B45 – B52 present a stylized way to calculate this metric. The first step is to break down mill expenditures into economic sectors used in standard regional modeling frameworks as shown in cells B24 – B43. In this case, we illustrate by listing the major sectors contained in the North American Industrial Classification System (NAICS). NAICS identifies 20 major sectors, including private households, the recipient sector for all salaries and wages paid by mills. Taken together, our hypothetical mill has spent $7,550,000 over the course of the year (cell B45).

Here is important to note that the level of such expenditures, at least in a few sectors, may be important to track by itself. For instance, all social investments fall under the category of "Other Services Except Public Administration and Households." The level of expenditures in this sector as well as expenditures on salaries and wages may be stand alone indicators of interest. As such, they are highlighted in peach in the spreadsheet to indicate that they are part of a larger aggregate but nonetheless important by themselves.

For each sector, various regional models in use by Washington State (including Washington's Office of Financial Management input-output model) provide employment and income multipliers which are used to estimate the indirect and induced effects of direct expenditures in each NAIC category. In a regional modeling framework, direct, indirect, and induced economic impacts are defined as:

- Direct impacts represent the immediate changes in employment or income resulting from an increase or decrease in mill expenditures in a particular sector such as industrial cleaning services.
- Indirect impacts are the changes in employment or income caused by the iteration of industries purchasing from industries resulting from direct expenditures. So when a mill increases expenditures on industrial cleaning services that sector, in turn, spends more money on inputs from its suppliers, who then turn around and spend more from their suppliers.
- Induced effects are the changes in employment or income in all local industries caused by the expenditures of new household income. In this case, additional household income is generated for employees and business owners in the industrial cleaning sector, including its suppliers.

Taken together, direct, indirect, and induced economic impacts represent the total regional economic impact of mill expenditures excluding non-market effects such as positive or negative externalities. Multipliers provide the means for converting direct expenditures into total regional economic impact. A hypothetical set of multipliers for each of the major NAICS sectors is shown in cells C24 – C43. An important aspect of these multipliers is the assumed "local purchasing coefficient," which is a number between zero and one reflecting the percentage of goods and services bought locally. A hypothetical set of local purchasing coefficients for each sector is provided in cells D24 – D43.

Another stand alone sustainability indicator recommended as part of the Project Task 2.2 report is – in effect – the local purchasing coefficient (LPC), or the percent of goods and services procured locally. Again, this column is highlighted in peach to reflect the fact that it is an important stand alone indicator included in the regional economic impact aggregate. If we want to insure that the regional economic impact indicator is sensitive to local procurement initiatives a mill may want to implement, we would need to modify the regional economic impact multipliers accordingly to reflect such initiatives. This is what is shown in cells E24 – E43. Note here that the LPC values for the Agriculture, Forestry Fishing and Hunting sector, Wholesale Trade, Retail Trade, and Private Households have been increased to reflect hypothetical local procurement initiatives for raw materials (pulp), retail and wholesale goods and services, and contractors. These modified LPC's, in turn, translate into a new set of multipliers shown in cells F24 – F43. The product of mill expenditures by NAICS category (cells B24 – B43) and these multipliers gives us the total regional economic impact as shown in cells G24 – G43. Cell B46 is the sum across all sectors – $14,693,801 in regional economic impact from a set of direct expenditures totaling $7,550,000.

Now, because we are dealing with mills of varying capacity, it is important to normalize the regional economic impact metric to facilitate comparison. In our hypothetical example, we do this by dividing the $14,693,801 regional economic impact figure by the number of employees (65) to arrive at a figure of $226,058 in regional economic impact per employee. As with ROCE, we can then compare this with an "industry best" or target level – say $300,000. Dividing $226,058 by $300,000 and then multiplying by 100 yields the positive footprint score for the regional economic impact aggregate indicator – 75. Expressed negatively, this is 25.

3.3. Customer satisfaction index.

As part of the Project Task 2.2 report, RP and CSE also recommended use a customer satisfaction index indicator that incorporates various sources of feedback from a mill's customers and stakeholders. Cells B57 – B83 demonstrate the calculation method for a hypothetical customer satisfaction index based on three simple indicators: (1) merchandise return rate; (2) customer complaints per $1 million in sales, and (3) percent favorable response to customer satisfaction surveys. The first two are negative indicators that a mill would want to minimize, the third a positive indicator. The first and third are percentages, the second a discrete value. Thus, the combination task is a bit more complex than the one used for the regional economic impact aggregate. Also, because these indicators all measure different things, they cannot be combined mathematically before they are converted into scores. For these reasons, the final customer satisfaction metric can be considered an index rather than an aggregate.

To convert raw indicator values for merchandise return rate (16%) and customer complaints per $1 million in sales (80) for our hypothetical mill into scores on a scale of 0 to 100, we follow the method outlined in Section 2.2 by setting industry best and industry worst values scores of 0 and 100 respectively. For merchandise return rate, the industry best and worst values are assumed to be 30% and 7%. For customer complaints per $1 million in sales, the best and worst values are assumed to be 120 and 10. As such, the baseline score of 0 corresponds to 7% for merchandise return rates and 10 for customer complaints. Each percentage point above this baseline corresponds to a 4.3478 increase in the merchandise return rate score [100/(30-7)] and a .9090 increase in the customer complaints score [(100/(120-10)]. So in our hypothetical example, the merchandise return rate raw indicator value of 16% translates into a score of (16-7)*4.3478 or 39.13. If the overall Industrial Footprint metric is positive, we then convert this to its positive inverse of 100-39.13 or 60.87. Likewise, the customer complaints raw indicator value of 80 translates into a score of (80-10)*.9090 or 63.64, or 36.36 if expressed positively. To convert the third simple indicator – percent favorable response – into a score we simply divide the raw indicator value by the industry best value, then multiply by 100 to get (.59/.75)*100 = 78.67, 21.33 if expressed negatively.

Now, it may be that we want to assign different weights to the three simple indicators included in the index. Say our preference is to give a weight of 40% (.40) to merchandise return rate, and 30% to the other two. To arrive at a weighted average of the three, we simply multiple each indicator's score by its weight then sum. By doing this, we arrive at the final indicator scores for the customer satisfaction index – 58.86 as a positive metric where 100 is the target, or 41.14 as a negative metric whose target is zero.

3.4 Domain and overall Industrial Footprint scores.

Once each indicator in each domain has been properly converted into either a positive or negative score on a scale of 100, it is relatively easy to derive the final Industrial Footprint score. The process is illustrated with reference to the Overall Footprint tab (Appendix B) on the attached spreadsheet. The spreadsheet derives scores for each domain in rows 5 – 23, and then an overall Industrial Footprint score in rows 25 – 32. Cells A7 – I11 include the calculations for the Economic Footprint domain.

For each indicator, the spreadsheet identifies its type, lists how many simple indicators are included (for aggregates and indices), displays raw (unweighted) scores (positive and negative), provides weights under "equal" and "assigned" weighting systems, and reports final (weighted) indicator scores. The weights under the "equal" weighting system are calculated by dividing 1 by the total number of simple indicators included in the domain (7, the sum of cells C8,9, and 10) and then multiplying by the number of simple indicators (for aggregates and indices). So the weight attached to both the regional economic impact and customer satisfaction index indicators is (1/7)*3 or .4286, while the weight attached to ROCE is simply (1/7)*1 or .1429. We can refer to this system as an "equal" weighting scheme because it assigns equal weights to all simple indicators in the domain, regardless of whether or not they are included in an aggregate or index.

We may, however, want to assign weights. If, for example, we consider ROCE to be the most significant indicator, regional economic impact slightly less so, and customer satisfaction relatively inferior, we can operationalize this subjective judgment by assigning respective weights of .50, .40, and .10 as illustrated in cells G8 – G10. If we go with these as the final weights, then the final scores (both positive and negative) are calculated by multiplying these weights by the raw indicator scores contained in cells D8 – E10 to arrive at the final scores displayed in cells H8 – I10. The final Economic Footprint domain score is simply the sum, showed below in cells H and I 11: 70.32 expressed positively, and 29.68 expressed negatively.

The spreadsheet replicates this method for 6 additional indicators in the Environmental Footprint and Social Footprint domains. The final step is simply to take each domain score, multiply by assigned weights (D28 – D30) and sum or take the simple average if domain weights are equal. In our example, the final Industrial Footprint score under an equal weighting system and with the Industrial Footprint expressed as a positive metric is the simple average of the three positive domain scores: [(70.32 (Economic) + 29.10 (Environmental) + 35.60 (Social))/3] = 45.01. Under the assigned weighting system, where the most weight is given to the Environmental Footprint (.50) followed by the Social (.3) and Economic (.2) Footprints, the calculation is [70.32*.20 + 29.10*.5+ 35.60*.3] = 39.29. The same method is used to arrive at the negative expressions of the Industrial Footprint, here, calculated as 54.99 under the equal weighting system and 60.71 with assigned weights.

Appendix A: Economic Footprint Calculations

Redefining Progress and Center for Sustainable Economy
Mock Aggregation Spreadsheet for Industrial Footprint Project
Tab 2: Economic Footprint Calculations

Individual indicators	stand alone	part of aggregate/ index
Aggregate indicators		
Indices		

Return on Capital Employed (ROCE)

	Mill A	Mill B	Mill C	Mill D
Facility earnings before interest and taxes ($ millions)	9.88	7.89	14.55	8.35
Facility assets	66.70	123.40	88.89	45.67
Facility liabilities	1.23	6.67	9.22	4.56
ROCE	15.09%	6.76%	18.26%	20.31%
Industry best or target	22.00%	22.00%	22.00%	22.00%
Percent industry best or target	0.69	0.31	0.83	0.92
ROCE footprint score (+)	68.59	30.72	83.01	92.32
ROCE footprint score (-)	31.41	69.28	16.99	7.68

Regional Economic Impact

Mill expenditures by NAICS two or three digit category:	Mill A ($ millions)	WA Multipler	Assumed LPC	Assigned LPC	WA Multipler (adj)	Regional Impact
Agriculture, Forestry, Fishing and Hunting (11)	0.10	2.33	0.55	0.90	3.81	0.38
Mining, Quarrying, and Oil and Gas Extraction (21)	0.22	3.44	0.45	0.45	3.44	0.76
Utilities (22)	0.06	1.23	0.34	0.34	1.23	0.07
Construction (23)	0.67	1.45	0.66	0.66	1.45	0.97
Manufacturing (31-33)	0.45	3.44	0.45	0.45	3.44	1.55
Wholesale Trade (42)	0.55	1.22	0.23	0.50	2.65	1.46
Retail Trade (44-45)	0.33	1.12	0.34	0.75	2.47	0.82
Transportation and Warehousing (48-49)	1.20	1.34	0.34	0.34	1.34	1.61
Information (51)	0.06	1.12	0.12	0.12	1.12	0.07
Finance and Insurance (52)	0.01	1.09	0.34	0.34	1.09	0.01
Real Estate and Rental and Leasing (53)	0.23	1.34	0.21	0.21	1.34	0.31
Professional, Scientific, and Technical Services (54)	0.10	1.45	0.45	0.45	1.45	0.15
Administrative, Support, Waste Management, Remediation Services (56)	0.20	1.67	0.32	0.32	1.67	0.33
Educational Services (61)	0.02	1.23	0.45	0.45	1.23	0.02
Health Care and Social Assistance (62)	0.06	1.45	0.37	0.37	1.45	0.09
Arts, Entertainment, and Recreation (71)	0.06	1.56	0.22	0.22	1.56	0.09
Accommodation and Food Services (72)	0.45	1.45	0.12	0.12	1.45	0.65
Other Services except Public Administration and Households (81)	0.33	1.66	0.23	0.23	1.66	0.55
Private Households - includes salaries (811)	2.23	1.67	0.65	0.75	1.93	4.30
Public Administration - includes all taxes and fees paid (92)	0.22	2.33	0.89	0.89	2.33	0.51

Total expenditures	7550000.00
Regional economic impact	14693800.96
Average annual employment	65.00
Regional economic impact per employee	226058.48
Industry best or target	300000.00
Percent of industry best or target	0.75
REI footprint score (+)	75.35
REI footprint score (-)	24.65

Cutomer Satisfaction Index

	Mill A
Merchandise return rate	0.16
Merchansise return industry worst	0.30
Merchandise return rate industry best	0.07
Merchandise return scaling factor	4.35
Merchandise return rate positive score	60.87
Merchandise return rate negative score	39.13
Merchandise return rate internal weight	0.40
Mechandise return rate weighted positive score	24.35
Merchandise return rate weighted negative score	15.65
Customer complaints per $1 million in sales	80.00
Customer complaints industry worst	120.00
Customer complaints industry best	10.00
Customer complaints scaling factor	0.91
Customer complaints positive score	36.36
Customer complaints negative score	63.64
Customer complaints internal weight	0.30
Customer complaints weighted positive score	10.91
Customer complaints weighted negative score	19.09
Percent favorable responses to customer satisfaction surveys	0.59
Percent favorable response industry best	0.75
Percent favorable response positive score	78.67
Percent favorable response negative score	21.33
Percent favorable response internal weight	0.30
Percent favorable response weighted positive score	23.60
Percent favorable response weighted negative score	6.40
Customer satisfaction index (+)	58.86
Customer satisfaction index (-)	41.14

Appendix B: Overall Footprint Calculations

Redefining Progress and Center for Sustainable Economy
Mock Aggregation Spreadsheet for Industrial Footprint Project
Tab 1: Overall Footprint Calculations

Footprint Scoring Summary by Domain: Mill A

Economic Footprint Domain	Indicator type	Simple indicators	Raw score (+)	Raw score (-)	Equal weight	Assigned weight	Adjusted score (+)	Adjusted score (-)
Return on capital employed	S	1	69	31	0.1429	0.5	34.30	15.70
Regional economic impact	A	3	75	25	0.4286	0.4	30.14	9.86
Customer satisfaction index	I	3	59	41	0.4286	0.1	5.89	4.11
	Sum or EW Average:	7	67.32	33	1	Domain scores:	70.32	29.68

Environmental Footprint Domain	Indicator type	Simple indicators	Raw score (+)	Raw score (-)	Equal weight	Assigned weight	Adjusted score (+)	Adjusted score (-)
Percent certified	S	1	23	77	0.1667	0.5	11.50	38.50
Water effluents	A	3	46	54	0.5000	0.3	13.80	16.20
Biological diversity index	I	2	19	81	0.3333	0.2	3.80	16.20
	Sum or EW Average:	6	33.17	67	1	Domain scores:	29.10	70.90

Social Footprint Domain	Indicator type	Simple indicators	Raw score (+)	Raw score (-)	Equal weight	Assigned weight	Adjusted score (+)	Adjusted score (-)
Accident rate	S	1	34	66	0.2000	0.2	6.80	13.20
Social investments	A	3	23	77	0.6000	0.6	13.80	46.20
Workforce diversity index	I	1	75	25	0.2000	0.2	15.00	5.00
	Sum or EW Average:	5	35.60	64	1	Domain scores:	35.60	64.40

Overall Footprint Score: Mill A

	Positive Score	Negative Score	Assigned Weights
Economic footprint	70.32	29.68	0.2
Environmental footprint	29.10	70.90	0.5
Social footprint	35.60	64.40	0.3
FP score with equal domain weights	**45.01**	**54.99**	
FP score with assigned domain weights	**39.29**	**60.71**	